

T16D07 – (16.2) Reaction Mechanism Notes

Name

1. 16.2.1 Explain that reactions can occur by more than one step and that the slowest step determines the rate of reaction (rate-determining step). (3)
2. 16.2.2 Describe the relationship between reaction mechanism, order of reaction and rate-determining step. (2)
 - a. What can a study of the reaction mechanism support?

- b. What is an intermediate?

- i. Use $\text{NO}_2(\text{g}) + \text{CO}_2(\text{g}) \rightarrow \text{NO}(\text{g}) + \text{CO}_2(\text{g})$ as an example:

- ii. Use $2\text{HI}(\text{aq}) + \text{H}_2\text{O}_2(\text{aq}) \rightarrow \text{I}_2(\text{aq}) + 2\text{H}_2\text{O}(\text{l})$ as an example:

- c. Molecularity is:

- i. Unimolecular:

- ii. Bimolecular:

- iii. Termolecular:

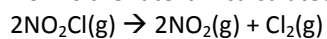
- d. What is the rate determining step?

- i. Use traffic as an example, draw a diagram:

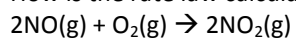
- ii. What is used to determine the rate law for a particular step? How is this different than the overall rate law that we have been calculating?

Equation for rate-determining step	Molecularity	Rate Law

- e. How is the rate law calculated when the rate-determining step is the **first step**?



- f. How is the rate law calculated when the rate-determining step is **not the first step**?



- g. Give an explanation to support the rate expression of an overall zero order reaction:

- h. What is the transition state theory (TST)?

- i. Use the reaction of $\text{H}_2\text{(g)} + \text{I}_2\text{(g)} \rightarrow 2\text{HI(g)}$ to explain using a diagram and labelling each part:

- ii. The TST explains that product compounds can only be formed if:

1.

2.

- iii. What two things must be known in order to calculate the reaction rates and transition states using TST:

1.

2.